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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/GB96/01189 (22) International Filing Date: 17 May 1996 (17.05.96) (30) Priority Data: 9510697.7 26 May 1995 (26.05.95) GB 9605573.6 16 March 1996 (16.03.96) GB (71) Applicant (for all designated States except US): MILLIKEN DENMARK A/S [DK/DK]; Fabriksvej, DK-8544 Mørke (DK). (71) Applicant (for TT only): PATTULLO, Norman [GB/GB]; 1 Redburn Avenue, Giffnock, Glasgow G46 6RH (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): LANG, Aage [DK/DK]; Grønnevej 2, DK-8560 Kolind (DK). LANG, Jan, Torben [DK/DK]; K.L. Knudsensvej 42, DK-8550 Ryomgaard (DK). DE MEYER, Willy [BE/BE]; Milliken Europe N.V., Ham 18-24, B-9000 Ghent (BE). (74) Agent: MURGITROYD & COMPANY; 373 Scotland Street, Glasgow G5 8QA (GB).			(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: FLOOR TEXTILE MATERIAL			
(57) Abstract <p>The invention provides a yarn suitable for use in making a cleanable dirt control textile, comprising at least two sets of fibres which have been twisted together, the first set comprising fibres of 32 to 100 decitex, the second set comprising fibres of 110 to 290 decitex, wherein finished yarn is of 6000 - 9800 decitex. Preferably, the yarn contains a total of from 3 to 8 fibres.</p>			

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1 FLOOR TEXTILE MATERIAL

2

3 The present invention relates to a floor textile, and
4 more particularly to a cleanable dirt control textile
5 which may be used for mats and for runners.

6

7 Mats are generally used in access ways where people
8 tend to brush or scrape their feet in order to prevent
9 carrying of moisture and/or dirt, accumulated on their
10 footwear, into other areas of the premises. Normally
11 these mats are located in areas of high pedestrian
12 traffic, such as doorways. Similarly, runners (for
13 example, long carpets in hotel corridors) have to cope
14 with high pedestrian traffic.

15

16 Mats or runners may be produced as roll goods from
17 which individual mats or runners can be prepared.
18 Generally it is preferable that mats and runners have
19 the appearance of conventional carpeting. In this
20 market a rustic enhanced surface is required which
21 ensures lasting rigid fibres whilst retaining an
22 acceptable appearance. It has previously been proposed
23 to provide floor textile material having the general
24 appearance and feel of carpeting, but which allows for
25 improved cleaning and may have the added feature of

1 having a dirt scraping effect.

2

3 British Patent Number 1527622 relates to a carpeting
4 material which comprises pile or tuft fibres which
5 comprise yarns of first carpet fibres along with second
6 fibres or filaments which are not part of said yarns
7 and are stiffer than the yarns and can act as dirt
8 scrapers.

9

10 It is desirable that floor textile material of this
11 kind should be capable of being thoroughly cleaned for
12 example, by washing. In British Patent Application
13 Number 2279247 it was stated that the form of materials
14 disclosed in GB Patent 1527622 created a problem
15 because, during washing the stiff fibres tend to be
16 washed out of the carpet material.

17

18 British Patent Application Number 2279247 was concerned
19 with solving this problem and disclosed a method for
20 forming a washable scraper carpet including the steps
21 of bringing a length of the scraper floor textile
22 material into contact with a corresponding length of
23 un-cured rubber material, applying heat to the un-cured
24 rubber material for a short period at a temperature
25 between 80°C and 120°C to enable the rubber viscosity
26 to reduce to a level where the rubber material can flow
27 round the stiff fibres, and applying heat and pressure
28 to the floor textile material to enable the rubber
29 material to laminate the carpet fibre material, so as
30 to be cured, and to bond to the mono-filaments and form
31 a backing.

32

33 The method described in Patent Application Number
34 2279247 overcomes the problem of stiff fibres tending
35 to be washed out of the floor textile material during
36 laundering, but provides a method which is complicated,

1 requires high temperatures for operation, and cannot be
2 directly substituted into conventional methods for
3 making carpet material.

4
5 The present invention aims to overcome the
6 disadvantages with the prior art.

7
8 According to the present invention there is provided a
9 yarn suitable for use in making a cleanable dirt
10 control textile, comprising at least two sets of fibres
11 which have been twisted together, the first set
12 comprising fibres of 32 to 100 decitex, the second set
13 comprising fibres of 110 to 290 decitex, wherein
14 finished yarn is of 6000 - 9800 decitex.

15
16 According to the present invention there is provided a
17 floor textile material comprising pile or tuft which
18 comprises yarn which consists of two sets which have
19 been twisted together, the first set comprising fibres
20 of 32 to 100 decitex, the second set comprising fibres
21 of 110 to 290 decitex, wherein the finished yarn is of
22 6000 - 9800 decitex.

23
24 Preferably, the yarn comprises fibres of polypropylene,
25 Nylon 6 or Nylon 6.6. Most preferably, polypropylene
26 fibres are used.

27
28 Preferably, the first set of fibres are of 32 to 40
29 decitex.

30
31 Preferably, the second set of fibres are of 285 to 290
32 decitex.

33
34 Preferably, the yarn contains a total of from 3 to 8
35 fibres.

36

1 In a floor textile material according to the present
2 invention where the yarn has been twisted with a
3 mixture of different decitex fibres a rigid, lasting
4 pile may be achieved which may allow for improved
5 cleaning function as compared with existing products
6 employed for the same purpose.

7
8 The integration of the fibres having decitex values in
9 the ranges stated above into a final yarn may provide a
10 textile material which may act as a dirt scraper and
11 has improved function in terms of accumulation of dirt
12 and water. Due to the integration, problems with
13 fibres being washed out does not occur.

14
15 The backing material may be latex, rubber, PVC,
16 thermoplast or thermoplastic elastomer and the use of
17 uncured rubber and/or a two step process is not
18 essential.

19
20 Preferably the yarn is twisted with 140 - 260 turns per
21 metre.

22
23 Floor textile material according to the present
24 invention uses a mixture of high decitex fibres within
25 the ranges specified above which are integrated with
26 low decitex fibres within the range specified above
27 into one yarn. Thus there are no separate yarns in
28 the mat, just a uniformed surface results.

29
30 The yarn can be heat set to a straight saxony look.
31 The carpet material can be UV protected for indoor and
32 outdoor use.

33
34 Carpet material according to the present invention
35 accumulates both dirt and water.

36

1 Yarn is formed using continuous filament fibre,
2 preferably of a heat set type. The fibres may be UV
3 protected.

4
5 For formation of a yarn for use in making textile
6 material according to the present invention fibres from
7 each of the aforementioned decitex ranges may be
8 combined and constructed to a twisted and heat set form
9 where the fibres consist of a mixture of 32 to 100 and
10 of 110 to 290 decitex per yarn filament. The yarn may
11 be twisted to 140 - 260 turns per metre resulting in
12 yarn of 6000 - 9800 decitex. For this process
13 conventional heat setting equipment may be used
14 (SUPERBA (TM) or SUESSEN (TM)). The final yarn is of a
15 continuous straight and rigid form.

16
17 For the formation of a mat, conventional tufting
18 machines can be used using cut, loop or cut-loop
19 type/designs in different gauges (5/32") to achieve a
20 pile height of between 5 - 15 mm and a stitch rate of
21 15 - 30 stitches per 10cm. The yarn of 6000 - 9800
22 decitex may be tufted into a primary backing of non-
23 woven, woven or spun bonded fabric. To form a mat the
24 yarn tufted primary backing may be attached to a
25 backing of latex, rubber, pvc, thermoplastic or
26 thermoplastic elastomer.

27
28 Embodiments of the inventions and tests involving them
29 are outlined in the following nonlimiting examples with
30 to the figures and tables wherein,

31
32 Figure 1A presents Table 1 giving a comparison in
33 water transportation across different mats.

34
35 Figure 1B presents Graph 1 and Graph 2
36 illustrating results of step test over 3 mats.

1 Figure 2 presents Table 2 indicating properties of
2 various mats.

3

4 Figure 3 presents Table 3 indicating function and
5 lifetime performance comparisons for a range of
6 mats.

7

8 One embodiment of the invention is described in the
9 Example 1 and its performance illustrated as outlined
10 in Example 2 and in the accompanying Graphs 1 and 2
11 (Figure 1B). A comparison between the mat of Example 1
12 and other mats is given on Table 1 (Figure 1A). Two
13 further embodiments are described in Examples 3 and 4
14 with associated test results for these embodiments
15 outlined in Example 5.

16

17 Example 1

18 Two polypropylene fibres of 32 decitex were mixed with
19 2 fibres of 285 decitex and twisted to 200 turns per
20 metre resulting in yarn fibres of 8600 decitex after
21 heat setting with SUPERBA (TM) heat setting equipment.

22

23 To form a mat a cut type tufting machine was used at
24 (5/32") gauge to achieve a height of approximately 8mm
25 at a stitch rate of 19 stitches per 10cm and the yarn
26 was tufted into a primary backing of spun bonded fabric
27 of polypropylene (Tyvar 3409-s 133g/m) in 150 cm width.

28

29

30 The yarn tufted primary backing was attached to a
31 backing of NBR latex with 600g/m² using a roller
32 technique.

33

34 Example 2

35

36 Comparison of efficiency of a material according to the

1 present invention against other materials.

2

3 A mat formed according to Example 1 was tested against
4 a NOMAD (TM) mat produced by 3M and against ASTRO TURF
5 to measure the ability of a mat according to the
6 present invention to accumulate water. In each case
7 the dimensions of the mat were 80cm x 120cm.

8

9 In Test 1 a mat of each of the materials to be tested
10 was placed in front of a sheet of paper. Two litres of
11 water were poured on the mat.

12

13 In Test 2 a tray containing 1 litre of water was placed
14 in front of a mat of each material to be tested which
15 in turn was in front of a sheet of paper.

16

17 Walkers crossed the mat and the sheet of paper fifty
18 times, each time stepping three times on the mat and
19 two times on the paper. In Test 2 the walkers stepped
20 in the tray of water each time before stepping onto the
21 mat.

22

23 After each test, the paper was weighed to measure the
24 amount of water which had been transferred from the mat
25 to the paper. The results are shown in Graph 1 and 2
26 (Figure 1B), Graph 1 relating to Test 1 and Graph 2
27 relating to Test 2. In each case, the mat material is
28 indicated on the x-axis and the weight gain in the
29 paper is indicated in grams on the y-axis.

30

31 In each case, the tested textile material held the
32 water better than the 3M mat or the ASTRO TURF,
33 indicating that accumulation of dirt and water in a mat
34 according to the present invention is more efficient
35 than in the other materials tested.

36

1 Further comparative tests involving the mat of Example
2 1 are reported in Table 1 (Figure 1A).

3

4 Example 3

5

6 A yarn was produced having a 4 ply construction
7 consisting of 2 plies of 2700/68/40 dpf and 2 plies of
8 monofilament 290 dtex/0.18 mm. These 4 plies were
9 twisted together at 160 turns per metre and heat set at
10 a temperature of 138°C on SUPERBA (TM) heat setting
11 equipment, giving a yarn 7293 dtex after heat setting.

12

13 The yarn was tufted on non woven substrate (110-150g/m²)
14 to a total weight of 850g/m² to 880 g/m² on a 5/32"
15 gauge tufting machine. Pile height was approximately
16 9mm.

17

18 Mats were produced in 4 metre width and a latex backing
19 was applied before slitting the 4 metre width into
20 rolls of 2 metres. The backing thickness is
21 approximately 2mm, thereby giving a total product
22 height of 11mm in use. Rubber or PVC can equally well
23 be used as backing in place of latex.

24

25 Example 4

26

27 A yarn was produced having a 3 ply construction
28 consisting of 2 plies of 2700/68/40 dpf and 1 ply of
29 monofilament 290 dtex/0.18 mm.

30

31 These plies were twisted together and heatset as
32 described for Example 3 giving a yarn of 6988 dtex
33 after heatsetting.

34

35 Mats were produced as described for Example 3.

36

1 Example 5

2

3 **Tests on Six Samples of Barrier Mats**

4

5 **Mats**

6

7 Six samples of barrier mats, each sample comprising two
8 pieces, measuring approximately 85 cm x 150 cm were
9 tested. These were:

10

11 Mat

12 3M Enhance (A)

13 3M Nomad (B)

14 Tufton Coral (C)

15 Scmidt Zone (D)

16 Example 4 Mat (E)

17 Example 3 Mat (F)

18

19 Hexapod Test and Lisson Tretrad Test were carried out
20 on the samples supplied.

21

22 The samples were conditioned and tested in the standard
23 atmosphere for conditioning and testing textiles (BS
24 EN20139:1992) of 65±2%r.h. and 20±2°C.

25

26 **Assessment of the change in Surface Structure and**
27 **Colour of Textile Floorcoverings - Hexapod Test**

28

29 One specimen from each sample was fatigued for 4,000
30 revs. and a second specimen for 12,000 revs. in a
31 Hexapod Tumbler Tester, in accordance with BS 6659:Part
32 2:1986. The specimens were vacuumed at every 2,000
33 revs. and before grading using a commercial upright
34 vacuum cleaner.

35

36 Each specimen was assessed for change in surface

1 structure and colour separately in accordance with BS
2 6659:Part 1:1986. The thickness was measured in five
3 places within the central band, using the method
4 described in BS 4051:1987, before and after fatiguing
5 to 40,000 revs. The thickness loss was calculated as a
6 percentage of the total carpet thickness.

7

8 5 No change

9 4 Slight change

10 3 Moderate change

11 2 Considerable change

12 1 Severe change

13

14 Colour was assessed using large size standard grey
15 scales. The results are presented in Table 2 (Figure
16 2).

17

18 **Lisson Tretrad Test**

19

20 Two specimens from each sample were tested on a Lisson
21 Tretrad for 1720 passages, in accordance with DIN
22 54322. The mean absolute weight loss for each sample
23 was calculated.

24

25 <u>Reference</u>	<u>Mean Weight Loss (g)</u>
---------------------	-----------------------------

26

27 3M Enhance (A)	1.3
-------------------	-----

28 3M Nomad (B)	2.7 (*)
-----------------	---------

29 Tufton Coral (C)	1.8
---------------------	-----

30 Schmidt Zone (D)	7.8
---------------------	-----

31 Example 4 (E)	0.6
------------------	-----

32 Example 3 (F)	+0.9
------------------	------

33

34 (*) The surface of the nosing of both specimens
35 started to break up after 500 passages.

36

1 Between 500 and 1000 passages, the rest of
2 each specimen started to break up, ie
3 fragments breaking off.

4
5 At the end of the test, the nosing of both
6 specimens had worn away.

7
8 Other Tests

9
10 Comparisons of the performance of the mats produced
11 according to Examples 3 and 4 with other known mats are
12 given in Table 3 (Figure 3).
13

1 Claims

- 2 1. A yarn suitable for use in making a cleanable
3 dirt control textile, comprising at least two sets
4 of fibres which have been twisted together, the
5 first set comprising fibres of 32 to 100 decitex,
6 the second set comprising fibres of 110 to 290
7 decitex, wherein finished yarn is of 6000 - 9800
8 decitex.
- 9 2. A yarn as claimed in Claim 1 wherein the fibres
10 comprise polypropylene, Nylon 6 or Nylon 6.6.
- 11 3. A yarn as claimed in any of the preceding Claims
12 wherein the first set of fibres are of 32 to 40
13 decitex.
- 14 4. A yarn as claimed in any of the preceding Claims
15 wherein the second set of fibres are of 285 to 290
16 decitex.
- 17 5. A yarn as claimed in any of the preceding Claims
18 wherein the yarn contains a total of from 3 to 8
19 fibres.
- 20 6. A yarn as claimed in any preceding Claim wherein
21 the yarn is twisted with 140 - 260 turns per
22 metre.
- 23 7. A yarn as claimed in any preceding Claim wherein
24 the yarn is formed using continuous filament
25 fibre.
- 26 8. A yarn as claimed in any preceding Claim wherein
27 the yarn is of a heat set type.
- 28 9. A yarn as claimed in any preceding claim wherein

1 the fibres are UV protected.

2 10. A floor textile material comprising a yarn as
3 claimed in any preceding Claim.

4 11. A floor textile material as claimed in Claim 10
5 further comprising backing material of latex,
6 rubber, PVC, thermoplast or thermoplastic
7 elastomer.

8 12. A floor textile as claimed in Claim 10 or 11
9 wherein the yarn is heat set to a straight saxony
10 look.

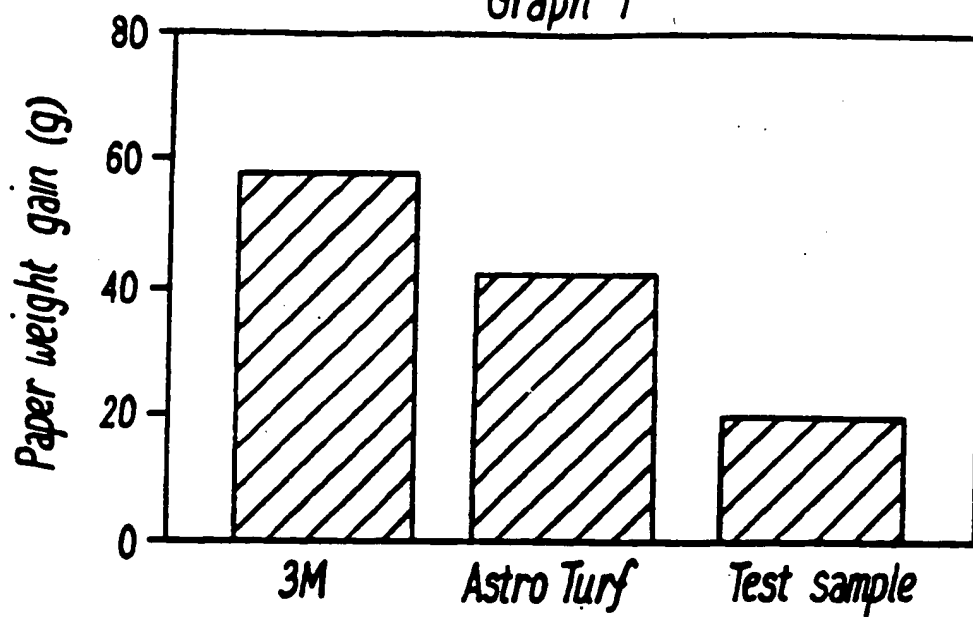
11 13. A floor textile material as claimed in any of
12 Claims 10 to 12 wherein the material is UV
13 protected.

TABLE 1

	<i>Example 1 Test Mat</i>	<i>3M Nomad</i>	<i>Smidt Mat Noodle Loop</i>	<i>Astro Turf Astro Turf</i>
<i>Washfastness</i>	<i>Washable</i>	<i>Not washable</i>	<i>Not washable</i>	<i>Not washable</i>
<i>Tuft lock, lb...:</i>	<i>3,73</i>	<i>1,94</i>	<i>1,5</i>	<i>Not applicable</i>
<i>Water transportation over mat⁵⁰ walk cycles</i>	<i>6 g.</i>	<i>123 g.</i>	<i>148 g.</i>	<i>268 g.</i>
<i>Water transportation from wet mat⁵⁰ walk cycles</i>	<i>20 g.</i>	<i>58 g.</i>	<i>164 g.</i>	<i>42 g.</i>

2/4

Graph 1



Graph 2

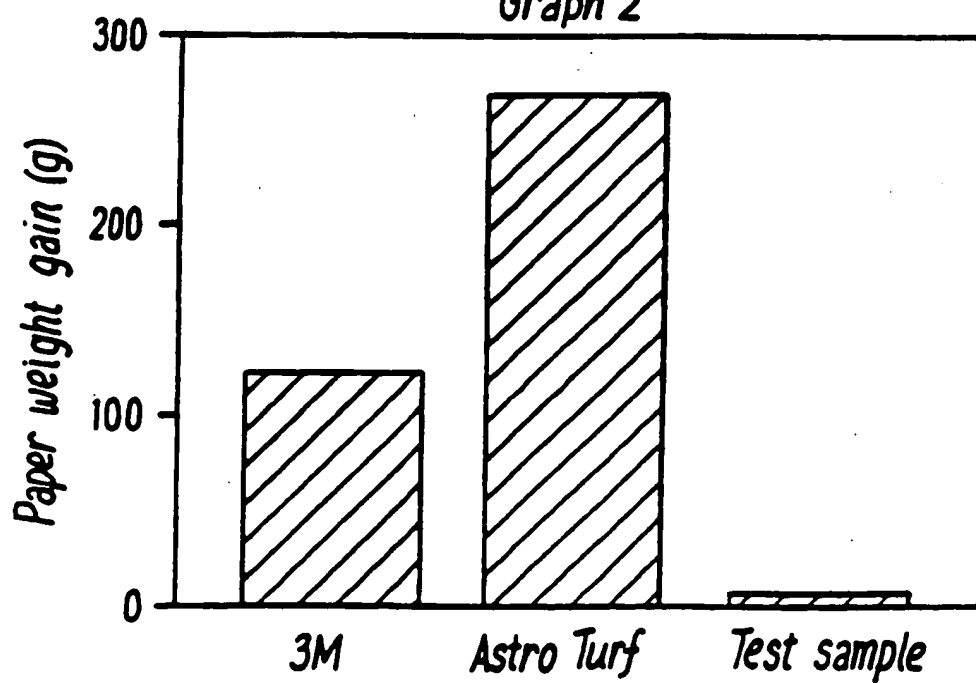
FIG.1B

TABLE 2

Reference	Number of Revolutions	Colour Change	Structure Change	Mean Thickness Loss after 4,000 revs (%)
3M Enhance (A)	4,000 12,000	3 2	3 2	23.9
3M Nomad (B)	4,000 12,000	4-5 4-5	5 5	3.6
Tufton Coral (C)	4,000 12,000	3 2-3	4 3-4	15.2
Schmidt Zone (D)	4,000 12,000	3 2-3	3 2	11.4
Example 4 (E)	4,000 12,000	3-4 2-3	2-3 2	9.9
Example 3 (F)	4,000 12,000	3-4 3	3 2-3	11.5

Fig.2

TABLE 3

WILAT	TEST	IMP	3M Enhance	3M Nomad	Tufton Coral+	Schmidt Zone	Schmidt HTN	Mulderbech Coir	Example 4	Example 3
1 Liq.abs	Water	10	30	0	20	50	40	40	45	40
2 Scraping	Dirt + W.1	10	30	10	20	40	15	45	45	50
3	Dirt + W.2	10	30	0	20	40	50	40	45	50
4 Hiding	Dry dirt	10	20	50	30	10	50	50	40	40
5	In use	10	40	40	30	20	10	20	30	35
SUBTOTAL FUNCTION			150	100	120	160	165	195	205	215
15 Compress.	Hex.colour	9	18	41	23	23	23	0	23	27
16	Hex.struct	9	18	45	32	18	18	0	18	23
17	Hex.thickn.	9	9	45	27	27	27	0	27	27
18 Abrasion	Lisson	9	27	0	27	9	9	0	36	45
SUBTOTAL LIFETIME			72	131	109	77	77	0	104	122
TOTAL PERFORMANCE			222	231	229	237	242	195	309	337

Performance is rated from 1 to 5 being the best.
That performance is then multiplied by the importance rating (customer),
* test after cleaning

Fig.3

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 96/01189

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D02G3/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 D02G A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	WO, A, 95 30040 (KLEENTEX INDUSTRIES, INC.) 9 November 1995 see page 3, line 5 - page 12, line 18; claims 1-5, 16, 21, 22, 25, 26	1-3
A	---	7, 8, 11
Y	US, A, 5 284 009 (E.I. DU PONT DE NEMOURS AND COMP.) 8 February 1994 see column 3, line 4 - column 5, line 10; claims 1, 4, 7; example 1; table 3	1-3
A	---	7, 8, 10
A	CH, A, 614 853 (PETER SMITH ASSOCIATES (CARPET IMPORTERS) LTD ET AL) 28 December 1979 see the whole document ---	1
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

23 August 1996

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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US-A-5102713	07-04-92	US-A- 5223317	29-06-93

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PCT/GB 96/01189

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 711 191 (SCHWARTZ,N.G.) 8 December 1987 ---	
A	US,A,5 102 713 (CORBIN,J.A.ET AL) 7 April 1992 -----	

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